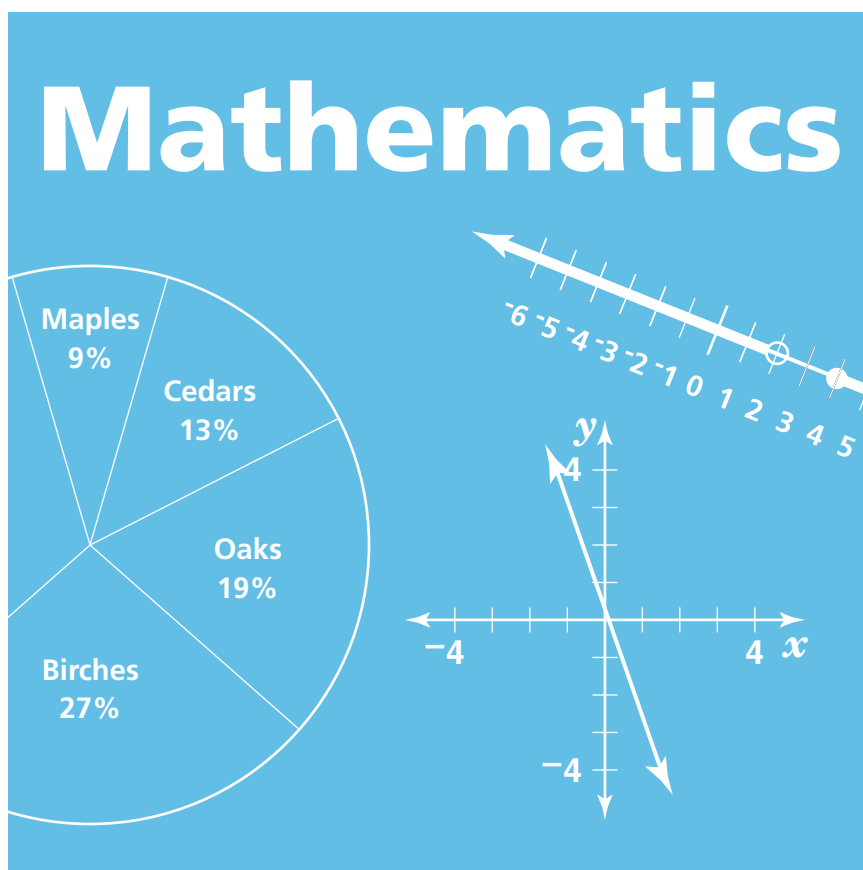


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


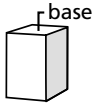

## Gateway Assessment Item Sampler



# Mathematics Reference Page

$d = rt$	distance = rate $\times$ time
Distance Formula:	$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$
Point-Slope Equation:	$y - y_1 = m(x - x_1)$
Pythagorean Theorem:	$a^2 + b^2 = c^2$
Slope Formula:	$m = \frac{y_2 - y_1}{x_2 - x_1}$
Slope-Intercept Equation:	$y = mx + b$
$\pi \approx 3.14$ or $\frac{22}{7}$	

$n$	$\sqrt{n}$	$n^2$
1	1.000	1
2	1.414	4
3	1.732	9
4	2.000	16
5	2.236	25
6	2.449	36
7	2.646	49
8	2.828	64
9	3.000	81
10	3.162	100
11	3.317	121
12	3.464	144
13	3.606	169
14	3.742	196
15	3.873	225
16	4.000	256
17	4.123	289
18	4.243	324
19	4.359	361
20	4.472	400
21	4.583	441
22	4.690	484
23	4.796	529
24	4.899	576
25	5.000	625

PERIMETER (P) and CIRCUMFERENCE (C)		
Any Polygon:	P = sum of side lengths	
Rectangle:	$P = 2l + 2w$	
Circle:	$C = 2\pi r$ or $\pi d$	
PLANE FIGURES	AREA (A)	
Triangle		$A = \frac{1}{2}bh$
Rectangle		$A = lw$
Circle		$A = \pi r^2$
SOLID FIGURES	VOLUME (V)	
Prism		$V = Bh$ or $V = lwh$
Cube		$V = s^3$

ABBREVIATIONS		
A = area	d = diameter	r = radius
B = area of base	h = height	s = length of side
b = base	l = length	V = volume
C = circumference	P = perimeter	w = width

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# Introduction to Gateway Mathematics

## Content of Tests

The testing program titled the *Tennessee Gateway Assessment* was established to meet the Tennessee mandate for high stakes, end-of-course assessments in Tennessee secondary schools. These tests measure the Tennessee Performance Indicators. Subject areas covered by the testing program include Mathematics, Language Arts, and Science.

## Test Development

For the *Tennessee Gateway Assessment*, a staff of writers—composed of both Tennessee teachers and professional test developers experienced in each of the content areas—researched and wrote the items. Professional editors and content specialists carefully reviewed all items and test directions for content and accuracy. To provide a large pool of items for final test selection, the test developers created approximately twice as many items as were needed in the final editions of the tests.

After tryout tests were administered, student responses were analyzed. Professional content editors and researchers carefully reviewed items, their data, and test directions for content, suitability, and accuracy before including particular items and test directions in operational tests.

## Test Administration

*Tennessee Gateway Assessment* tests are given to students as they near the end of courses that are included in the program. Tests may be given midyear for block schedules or near the end of the school year.

Each test contains 62 multiple-choice questions.

Students will have ample time to read and answer each of the questions. Each test has been designed to be administered in one session. The first 15 minutes are set aside to complete identifying data on the answer sheet, and the last 5 minutes are set aside to complete the Opportunity to Learn Survey.

A reference page, similar to the one located in this Item Sampler, will be on the inside front cover of the actual test. This page includes a list of formulas, equations, and tables for use during testing.

Calculator use is optional. Sharing calculators during testing is not permitted.

The following types of calculators may not be used:

- pocket organizers;
- electronic writing pads or pen input devices;
- models with built-in capability to simplify algebraic expressions, multiply polynomials, or factor polynomials (often called Computer Algebra Systems);
- models that can communicate (transfer data or information) wirelessly with other calculators.

You may use any four-function, scientific, or graphing calculator, as long as it does not have any of the features listed above.

Some prohibited calculator models are:

- Casio CFX-9970G
- Casio Algebra FX 2.0
- Hewlett-Packard HP-40G
- Hewlett-Packard HP-49G
- Texas Instruments TI-89
- Texas Instruments TI-92

(These calculators are not allowed because they have symbolic algebra capabilities.)

# Tips for Students Taking the Test

## Preparing for the test

- Review this Tennessee Gateway Item Sampler for Mathematics carefully and thoroughly.
- Acquire a Tennessee Gateway Practice Test for Mathematics, and take the test several times.
- Become familiar with the correct way to mark answers on the answer sheet. There is a sample answer sheet in the Practice Test.

## Before the test

- Get a good night's sleep. To do your best, you need to be rested.

## During the test

- Relax. It is normal to be somewhat nervous before the test. Try to relax and not worry.
- Listen. Listen to and read the test directions carefully. Ask for an explanation of the directions if you do not understand them.
- Plan your time. Do not spend too much time on any one question. If a question seems to take too long, skip it and return to it later. Answer all questions you are sure of first.
- Think. If you are not sure how to answer a question, read it again and try your best to answer the question. Rule out answer choices that you know are incorrect and choose from those that remain.

## Directions for Using the Item Sampler

This Item Sampler for Mathematics provides specific information to students and teachers. It contains examples of different item types for each Performance Indicator that may be tested in any given Gateway test administration. Performance Indicators have been grouped under Reporting Categories. These Reporting Categories will be used to report information regarding performance on the Gateway tests to students, teachers, schools, and systems.

The items in this Item Sampler will **not** be found in the Gateway tests. The number of items in this Item Sampler does not reflect the emphasis of content on the test. In order to identify the emphasis of content, the Gateway Assessment Practice Test for Mathematics should be used. The Practice Test gives a better representation of content emphasis across Reporting Categories and Performance Indicators.

You may use your calculator and Reference Page located at the beginning of this Item Sampler to help you solve the problems. An Answer Key is located on page 52. Use it to check your answers. Review items that you get wrong.

**Reporting Category:****1. Number Sense/Theory****Performance Indicator:**

select the best estimate for the coordinate of a given point on a number line (only rational)

Numbers 1 and 2

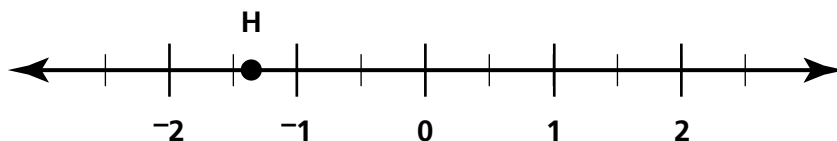
**1** Which of these is the best estimate of the coordinate of Point H on the number line?

**A**  $-1\frac{3}{8}$

**B**  $-1\frac{1}{2}$

**C**  $-1\frac{5}{8}$

**D**  $-2\frac{5}{8}$



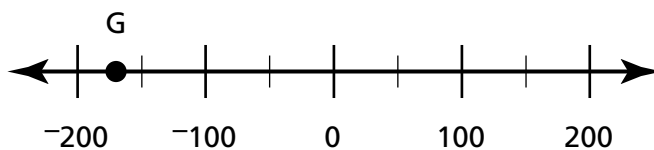
**2** Which of these is the best estimate of the coordinate of Point G on the number line?

**F** -200

**G** -190

**H** -170

**J** -150



**Reporting Category:****1. Number Sense/Theory****Performance Indicator:**  
Numbers 3 and 4

identify the opposite of a rational number

**3** What is the opposite of  $\frac{25}{43}$  ?

- A**  $-\frac{43}{25}$
- B**  $-\frac{25}{43}$
- C**  $\frac{43}{25}$
- D**  $25 \times 43$

**4** What is the opposite of  $-0.8$  ?

- F**  $-8.0$
- G**  $-1.25$
- H**  $0.2$
- J**  $0.8$

**Performance Indicator:**  
Number 5

determine the square root of a perfect square less than 169

**5** Simplify:  $\sqrt{36}$ 

- A** 3.6
- B**  $3^2$
- C** 6
- D** 12

**Reporting Category:****1. Number Sense/Theory****Performance Indicator:****order a given set of rational numbers (both fraction and decimal notations)****Numbers 6 and 7****6** Which of these sets of numbers is ordered from least to greatest?**F** -5.2, -5, -4.9, 4.1, 6**G** 4.1, -4.9, -5, -5.2, 6**H** -5.2, -5, 4.1, -4.9, 6**J** 6, 4.1, -4.9, 5, -5.2**7** Which of these sets of numbers is ordered from least to greatest?**A**  $-\frac{3}{2}$ , -3, 0,  $\frac{2}{3}$ **B** -3,  $-\frac{3}{2}$ , 0,  $\frac{2}{3}$ **C** 0,  $\frac{2}{3}$ ,  $-\frac{3}{2}$ , -3**D** 0,  $-\frac{3}{2}$ , -3,  $\frac{2}{3}$ **Performance Indicator:**  
**Number 8****identify the reciprocal of a rational number****8** What is the reciprocal of -110 ?**F** -55**G**  $-\frac{1}{110}$ **H**  $\frac{1}{110}$ **J** 110

**Reporting Category:****1. Number Sense/Theory****Performance Indicator:**

select ratios and proportions to represent real-world problems (e.g., scale drawings, sampling, etc.)

**Numbers 9 through 11****9**

A recipe for 12 muffins uses 2 cups of oatmeal. Tyler wants to bake 40 muffins. Which proportion below should he use to find the amount of oatmeal needed?

**A**  $\frac{2}{12} = \frac{x}{40}$

**B**  $\frac{12}{40} = \frac{x}{2}$

**C**  $\frac{2}{x} = \frac{40}{12}$

**D**  $\frac{x}{12} = \frac{2}{40}$

**10**

The zoo's herd of zebras has 44 female zebras and 36 male zebras. Which of these is the correct ratio of females to the total number of zebras?

**F** 9 to 11

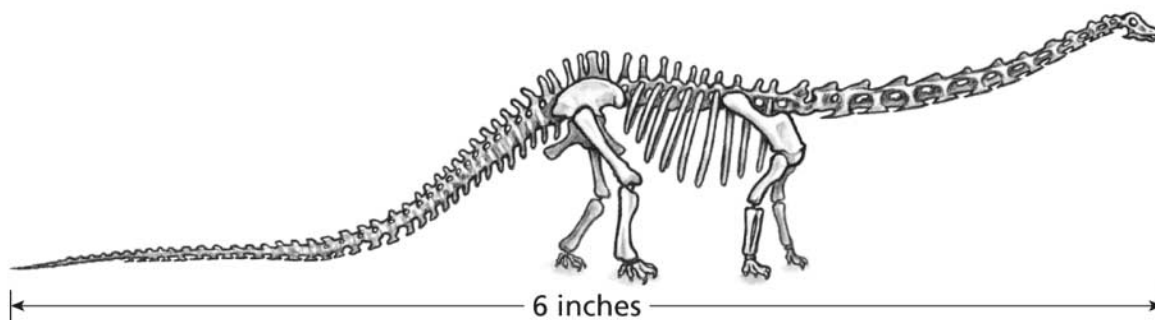
**G** 9 to 20

**H** 11 to 9

**J** 11 to 20

**11**

Olivia did her science project on dinosaurs. She drew the following scale drawing of a Diplodocus skeleton.



The drawing is 6 inches long. It represents a skeleton that is 90 feet long. What is the ratio of the length of the skeleton to the length of the drawing? (1 foot = 12 inches)

**A** 15 to 1

**B** 45 to 1

**C** 180 to 1

**D** 540 to 1

**Reporting Category:****1. Number Sense/Theory****Performance Indicator:**

apply order of operations when computing with integers using no more than two sets of grouping symbols and exponents 1 and 2

**Number 12**

**12** Simplify:  $3 - 4(5 - 2) + 4^2$

**F** -3

**G** 7

**H** 9

**J** 13

**Performance Indicator:**

select a reasonable solution for a real-world division problem in which the remainder must be considered

**Number 13**

**13** Olivia is planting a row of corn 30 feet long. She needs 6 seeds per foot. There are 25 seeds in a packet. How many packets of seed will Olivia need to buy?

**A** 6

**B** 7

**C** 8

**D** 10

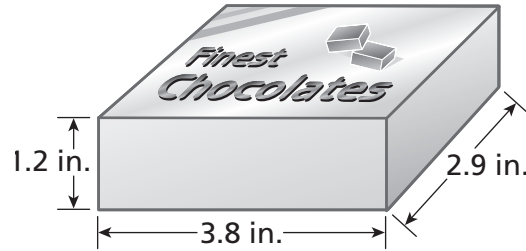
**Reporting Category:****1. Number Sense/Theory****Performance Indicator:**

use estimation to determine a reasonable solution for a tedious arithmetic computation

**Numbers 14 and 15**

- 14** Which of these is the best estimate of the volume of this candy box?

- F** 6 cubic inches
- G** 8 cubic inches
- H** 12 cubic inches
- J** 24 cubic inches



- 15** Travis has three pieces of rope. Their lengths are 3.94 m, 10.07 m, and 6.89 m. Which is the best estimate of how many meters of rope Travis has in all?

- A** 19 meters
- B** 20 meters
- C** 21 meters
- D** 22 meters

**Reporting Category:****2. Algebraic Expressions****Performance Indicator:**  
Numbers 16 and 17

use exponents to simplify a monomial written in expanded form

**16** Simplify:

$$y \cdot z \cdot y \cdot y \cdot z \cdot z \cdot z \cdot z$$

**F**  $y^3z^5$

**G**  $15yz$

**H**  $y^3 + z^5$

**J**  $3y + 5z$

**17** Simplify:

$$2 \cdot 7 \cdot f \cdot f \cdot f \cdot f \cdot g \cdot g \cdot g \cdot g$$

**A**  $144fg$

**B**  $14f^4g^4$

**C**  $70f^4g^4$

**D**  $9 + 4f + 4g$

**Performance Indicator:**  
Numbers 18 and 19

add and subtract algebraic expressions

**18** Simplify:  $4(2x - 4) + (-3x + 1)$ 

**F**  $5x - 3$

**G**  $5x - 15$

**H**  $11x - 3$

**J**  $11x - 15$

**19** Simplify:  $(5x^2 + 8x - 4) - (x^2 - 2x + 6)$ 

**A**  $4x^2 + 6x + 2$

**B**  $4x^2 + 10x - 10$

**C**  $6x^2 + 6x + 2$

**D**  $6x^2 + 10x - 10$

**Reporting Category:****2. Algebraic Expressions****Performance Indicator:**

multiply two polynomials with each factor having no more than two terms

**Number 20****20** Simplify:  $(4x + 2)(x - 3)$ 

**F**  $5x - 1$

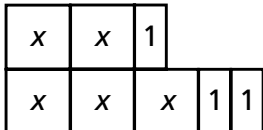
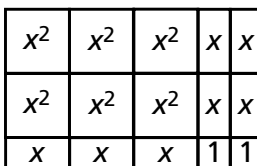
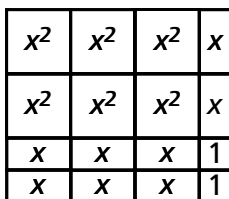
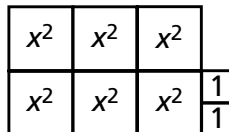
**G**  $4x^2 - x - 1$

**H**  $4x^2 - 10x - 6$

**J**  $4x^2 + 14x + 6$

**Performance Indicator:**

select the area representation for a given product of two one-variable binomials with positive constants and coefficients

**Number 21****21** Which of these figures is an area representation of  $(3x + 2)$  multiplied by  $(2x + 1)$ ?**A****C****B****D**

**Reporting Category:****2. Algebraic Expressions****Performance Indicator:**  
**Numbers 22 and 23**

extend a numerical pattern

- 22** As shown in the table, the cost of renting a car depends on the number of miles driven.

**RENTAL CAR COST**

Miles	Cost
10	\$52.50
20	\$55.00
30	\$57.50
40	\$60.00
50	\$62.50

If a rental car is driven 60 miles, which of these is the cost?

- F** \$62.75  
**G** \$64.00  
**H** \$65.00  
**J** \$67.50

- 23** What is the next number in the sequence below?

2, 3, 5, 8, 12, 17, 23,

- A** 27  
**B** 28  
**C** 29  
**D** 30

**Performance Indicator:**  
**Number 24**

translate a verbal expression into an algebraic expression

- 24** The statement “ten more than seven times a number  $x$ ” is represented by which of these expressions?

- F**  $7 + 10x$   
**G**  $10 + 7x$   
**H**  $7(10 + x)$   
**J**  $10(7 + x)$

**Reporting Category:****2. Algebraic Expressions****Performance Indicator:**

evaluate a first degree algebraic expression given values for one or more variables

Number 25

**25** What is the value of the expression  $3(x + 7)$  when  $x = -2$  ?

- A** -27
- B** 1
- C** 12
- D** 15

**Performance Indicator:**

evaluate an algebraic expression given values for one or more variables using grouping symbols and/or exponents less than four

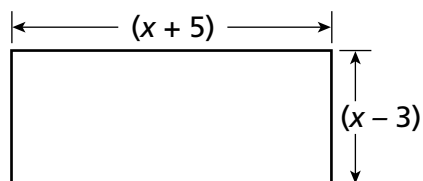
Numbers 26 and 27

**26** Evaluate:  $2x^3 + x^2 - 4x - 6$  given  $x = -3$

- F** -71
- G** -39
- H** -18
- J** 69

**27** Find the area of the rectangle if  $x = 6$ .

- A** 14
- B** 15
- C** 28
- D** 33



**Reporting Category:****3. Equations and Inequalities****Performance Indicator:**

solve one- and two-step linear equations using integers (with integral coefficients and constants)

Number 28

**28** Solve:  $-2x + 14 = 20$

**F** -17

**G** -12

**H** -3

**J** 8

**Performance Indicator:**

select the algebraic notation which generalizes the pattern represented by data in a given table

Numbers 29 and 30

**29** Which of these is the equation of the line that generalizes the pattern of the data in the table?

**A**  $f(x) = 2x$

**B**  $f(x) = x + 2$

**C**  $f(x) = 3x + 2$

**D**  $f(x) = 4x + 1$

$x$	$f(x)$
-2	-4
0	2
1	5
3	11

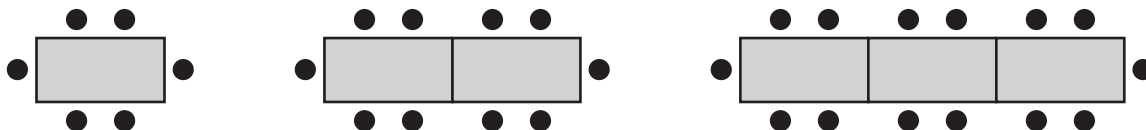
**Reporting Category:****3. Equations and Inequalities****Performance Indicator:**

select the algebraic notation which generalizes the pattern represented by data in a given table

Numbers 29 and 30

**30**

Mrs. Silva is arranging rows of worktables for her class.



The table below shows the relationship between the number of worktables in a row and the maximum number of students who can be seated.

Number of Worktables (W)	Maximum Students (S)
1	6
2	10
3	14
4	18

Which of these functions generalizes the pattern of data in the table?

**F**  $S = 4W$

**G**  $S = W + 5$

**H**  $S = 4W + 2$

**J**  $S = 5W - 2$

**Reporting Category:****3. Equations and Inequalities****Performance Indicator:**  
**Numbers 31 and 32**

translate a verbal sentence into an algebraic equation

**31** Marian rented a ballroom for the spring dance. She paid a flat fee of \$750.00, plus \$125.00 for each hour ( $h$ ) the ballroom was used. Which statement represents the total cost ( $c$ ) of renting the ballroom?

**A**  $c = 125h$

**B**  $c = 750h$

**C**  $c = 750 + 125h$

**D**  $c = 750h + 125$

**32** Which of these equations represents "the number  $n$  squared, divided by eight, equals the square root of three"?

**F**  $\frac{2^n}{8} = \frac{1}{3^2}$

**G**  $\frac{n}{8^2} = \sqrt[3]{2}$

**H**  $\frac{2^n}{8} = 3^2$

**J**  $\frac{n^2}{8} = \sqrt{3}$

**Performance Indicator:**

solve multi-step linear equations (more than two steps, variables on only one side of the equation)

**Number 33**

**33** Solve:  $4(3x - 2) - 8x = 16$

**A** 2

**B**  $\frac{8}{3}$

**C**  $\frac{9}{2}$

**D** 6

**Reporting Category:****3. Equations and Inequalities****Performance Indicator:**

solve multi-step linear equations (more than two steps, with variables on both sides of the equation)

Number 34

**34** Solve:  $4(x - 2) - 1 = 3x - 7$

**F**     $-16$

**G**     $-4$

**H**     $2$

**J**     $16$

**Performance Indicator:**

solve multi-step linear equations (more than two steps, with one set of parentheses on each side of the equation)

Number 35

**35** Solve:  $2(3x - 1) = x - 4(x + 2)$

**A**     $-\frac{2}{3}$

**B**     $\frac{1}{3}$

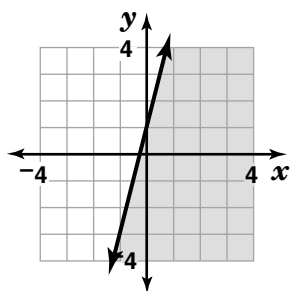
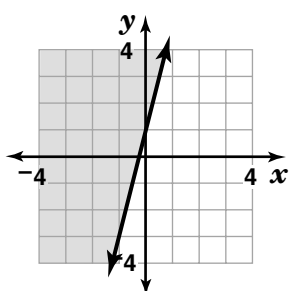
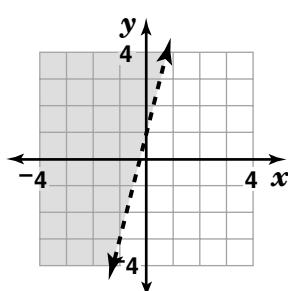
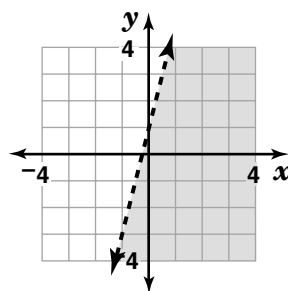
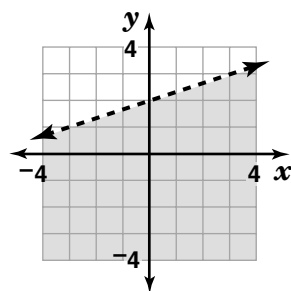
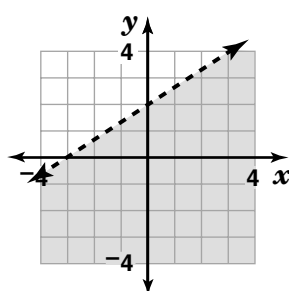
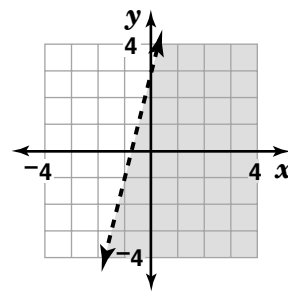
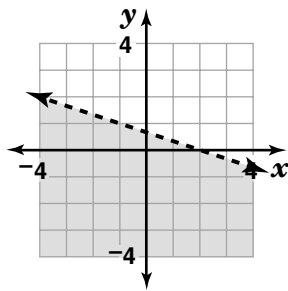
**C**     $\frac{4}{9}$

**D**     $\frac{10}{9}$

**Reporting Category:****3. Equations and Inequalities****Performance Indicator:**

select the appropriate graphical representation of a given linear inequality

Numbers 36 and 37

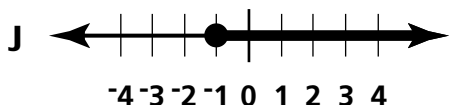
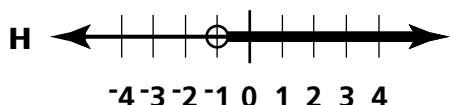
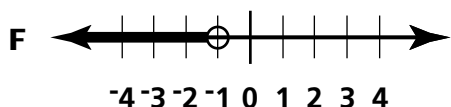
**36** Which of these graphs represents the inequality  $y \geq 4x + 1$  ?**F****G****H****J****37** Which of these graphs represents the inequality  $3y < x + 6$  ?**A****B****C****D**

**Reporting Category:****3. Equations and Inequalities****Performance Indicator:**

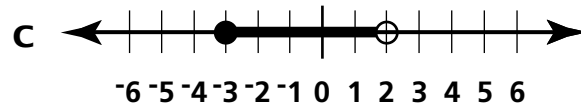
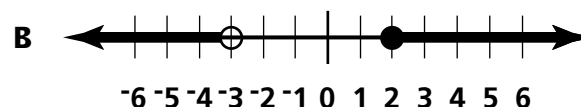
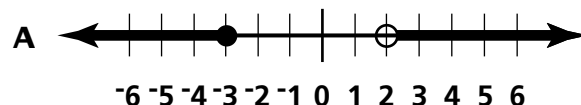
identify the graphical representation of the solution to a one variable inequality on a number line

Numbers 38 and 39

**38** Which of these graphs represents  $x > -1$  ?



**39** Which of these graphs represents  $x \leq -3$  or  $x > 2$  ?



**Reporting Category:****4. Real World Problems****Performance Indicator:**

apply the concept of slope to represent rate of change in a real-world situation

**Numbers 40 and 41****40**

A researcher recorded the number of badgers observed in a park each year for 20 years. This table shows the number of badgers recorded in two years.

Which of these expressions represents the average rate of change between Year 7 and Year 13 in badgers observed per year?

Year	Number Badgers
7	63
13	89

**F**  $\frac{89 - 63}{13 - 7}$

**G**  $\frac{13 - 7}{89 - 63}$

**H**  $\frac{89 - 13}{63 - 7}$

**J**  $\frac{63 - 89}{13 - 7}$

**41**

A sweet pea vine grows 40 centimeters per month. It was 20 centimeters tall on April 15. On what date will it most likely be 80 centimeters tall?

**A** May 15

**B** June 1

**C** June 15

**D** July 1

**Reporting Category:****4. Real World Problems****Performance Indicator:****calculate rates involving cost per unit to determine the best buy (no more than three samples)****Number 42**

- 42** Joyce wants to buy chocolate chips to make chocolate chip cookies. She has these three brands to choose from.

Which of these statements is **true**?

- F** Silverton is the least expensive per ounce.
- G** Carniglia's is the least expensive per ounce.
- H** Blake's Best is the most expensive per ounce.
- J** Blake's Best and Silverton cost the same amount per ounce.

Brand	Size (ounces)	Price
Blake's Best	16	\$2.89
Carniglia's	8	\$1.59
Silverton	12	\$1.99

**Performance Indicator:****apply the concept of rate of change to solve real-world problems****Number 43**

- 43** One lunch period, popcorn sold at a rate of 5 bags every 3 minutes. The lunch period lasted 45 minutes. How many bags of popcorn were sold?

- A** 27
- B** 53
- C** 75
- D** 225



**Reporting Category:****4. Real World Problems****Performance Indicator:**  
Numbers 44 through 46

solve multi-step linear inequalities in real-world situations

- 44** Lisa sold hair clips at a craft fair. She sold small hair clips ( $s$ ) for \$5 and big hair clips ( $b$ ) for \$8. She made more than \$120 in total sales, which can be represented by the inequality  $5s + 8b > 120$ . Which of these ordered pairs ( $s$ ,  $b$ ) satisfies the inequality?

- F** (6, 11)
- G** (9, 10)
- H** (11, 8)
- J** (13, 6)

- 45** Betty has 4 apple trees that each produce between 100 and 150 pounds of apples per year. She also has 2 pear trees that each produce between 75 and 100 pounds of pears per year.

Which of these inequalities represents the possible range of total pounds of fruit that all of Betty's trees together will produce in a year?

- A** 75 pounds  $\leq x \leq$  150 pounds
- B** 150 pounds  $\leq x \leq$  600 pounds
- C** 175 pounds  $\leq x \leq$  250 pounds
- D** 550 pounds  $\leq x \leq$  800 pounds

- 46** Jason earns money doing yard work. One weekend, he earned more than \$80. He earned \$32 mowing Mr. Smith's lawn. He also did yard work for Ms. Jones. Ms. Jones paid Jason \$8 per hour. Determine the number of hours ( $x$ ) Jason worked for Ms. Jones. Use this inequality:

$$8x + 32 > 80$$

- F**  $x < 6$
- G**  $x > 6$
- H**  $x < 14$
- J**  $x > 14$

**Reporting Category:****4. Real World Problems****Performance Indicator:**

**determine the mean (average) of a given set of real-world data (no more than five two-digit numbers)**

**Number 47**

**47**

Lance has five dogs. The weights of his dogs, in pounds, are listed below.

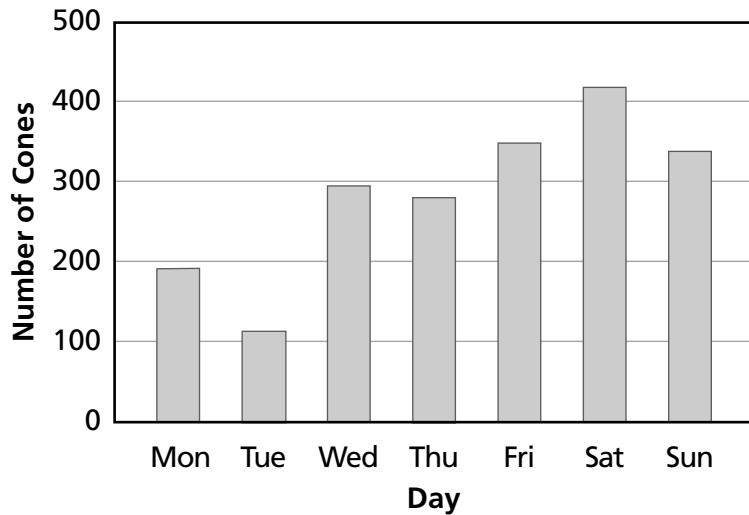
86, 14, 55, 7, 33

What is the mean weight of Lance's dogs?

- A** 33 pounds
- B** 39 pounds
- C** 44 pounds
- D** 55 pounds

**48**

The bar graph shows the number of ice cream cones sold by a store each day for a week.

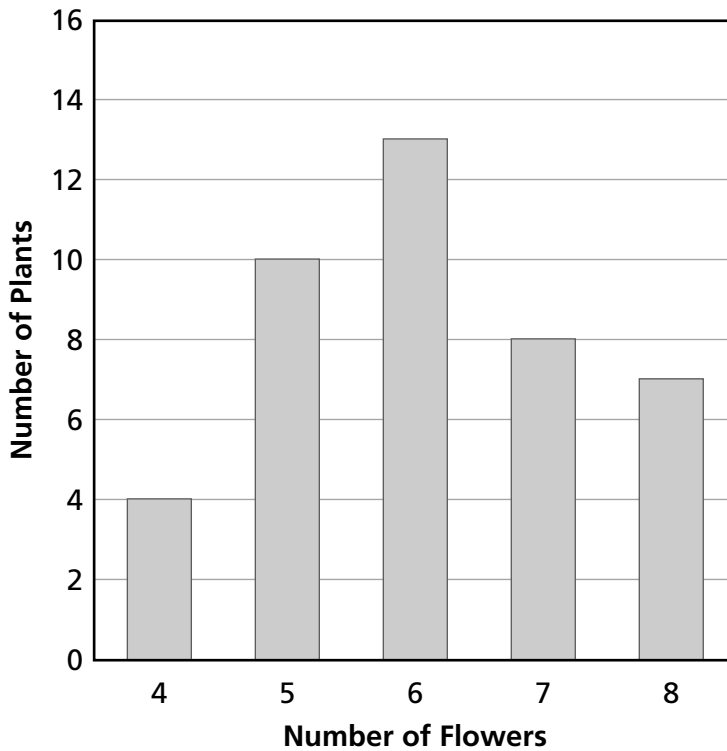


Which of these statements is false?

- F** On 4 days, less than 300 ice cream cones were sold.
- G** More than 500 ice cream cones were sold on Saturday.
- H** The greatest increase in sales happened on Wednesday.
- J** Approximately 200 ice cream cones were sold on Monday.

**49**

Melissa counted the number of flowers on each plant in her garden. The bar graph shows the results of her count.



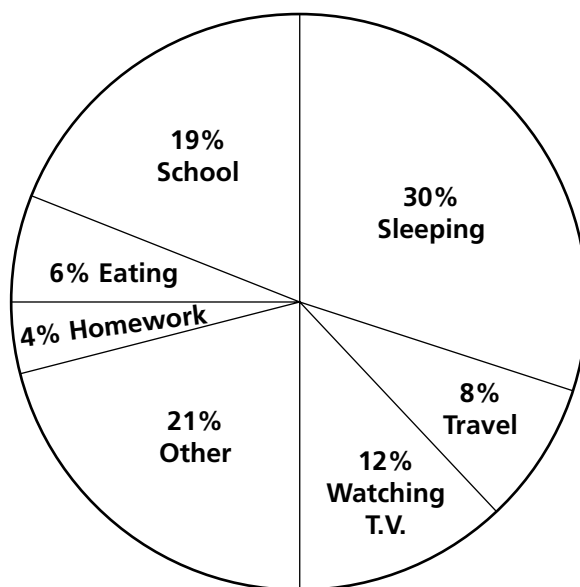
How many plants had at least 6 flowers?

- A** 14
- B** 15
- C** 27
- D** 28

- 50** The pie chart shows the percentage of time Chuck spends on different activities during a typical day.

What percentage of Chuck's time is spent in school, travel, watching television, and doing homework combined?

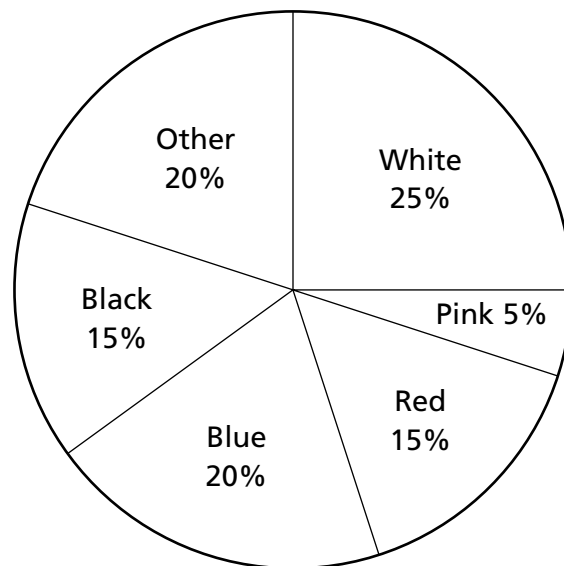
- F** 33%  
**G** 39%  
**H** 43%  
**J** 49%



- 51** Alexa recorded the percentage of people on a bus wearing different colors of shirts. Her results are shown in the pie chart.

There were 40 people on the bus. How many people were wearing a blue shirt?

- A** 5  
**B** 6  
**C** 8  
**D** 10



**Reporting Category:****4. Real World Problems****Performance Indicator:****determine the median for a given set of real-world data (even number of data)****Number 52**

- 52** Becky measured the heights of her friends. Their heights, in inches, are given below.

59, 68, 73, 58, 65, 62, 68, 67

What is the median height of Becky's friends?

- F** 65 inches
- G** 66 inches
- H** 67 inches
- J** 68 inches

**Performance Indicator:****apply counting principles of permutations or combinations in real-world situations****Numbers 53 through 55**

- 53** There are 4 contestants in a bicycle race. In how many different orders can they cross the finish line?

- A** 4
- B** 10
- C** 16
- D** 24

- 54** Clayton has to read 3 books for English class. He can choose from a list of 5 books. How many different combinations of 3 books are possible?

- F** 8
- G** 10
- H** 15
- J** 30

- 55** Carly is making cupcakes with nuts. She can choose between 4 flavors of cupcakes, 3 colors of frosting, and 2 kinds of nuts. She chooses one flavor, one color, and one kind of nut. How many different types of cupcakes could be made?

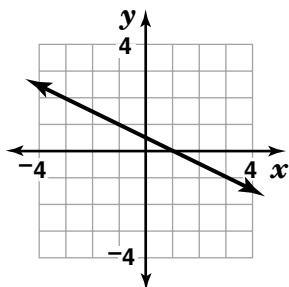
- A** 9
- B** 12
- C** 18
- D** 24

**Reporting Category:****5. Graphs and Graphing****Performance Indicator:**

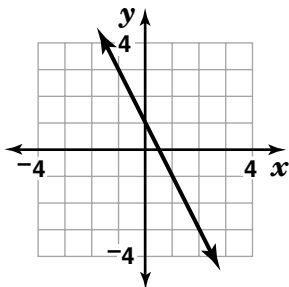
select the graph that represents a given linear function expressed in slope-intercept form

Number 56

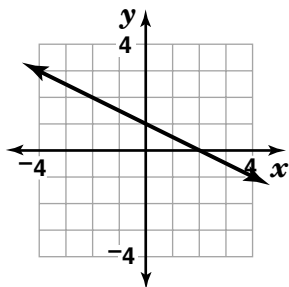
**56** Which of these graphs represents  $y = -\frac{1}{2}x + 1$ ?



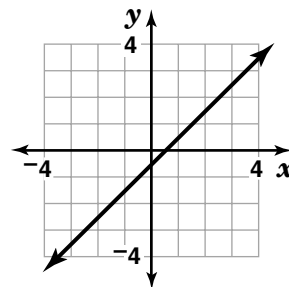
**F**



**G**

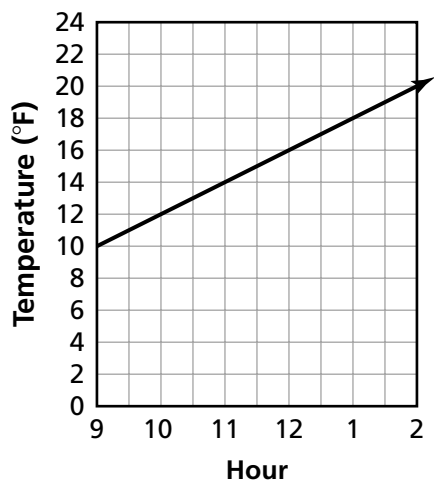


**H**

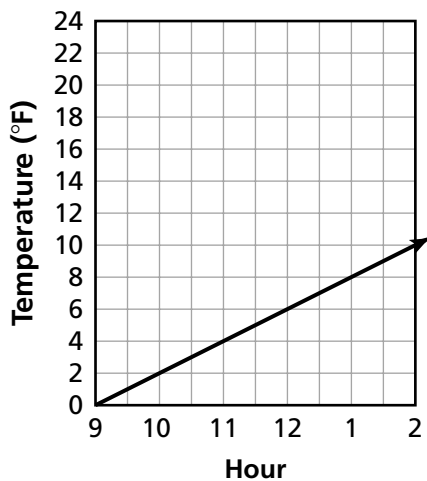


**J**

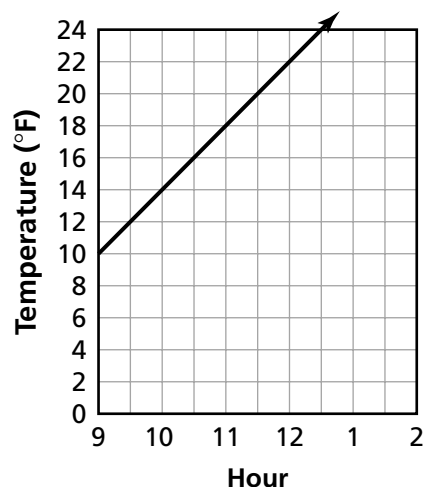
- 57** One cold day, Breanna recorded the temperature every hour. At 9 A.M. the temperature was  $10^{\circ}\text{F}$ . The temperature rose  $2^{\circ}\text{F}$  per hour for the next 5 hours. Which graph best models the temperature that day?



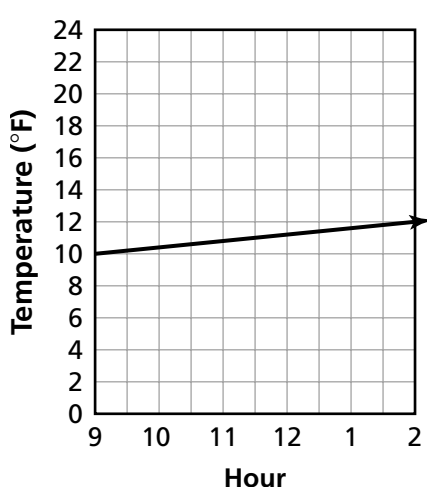
A



C



B

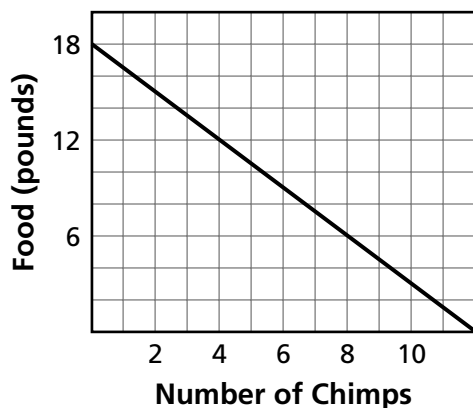
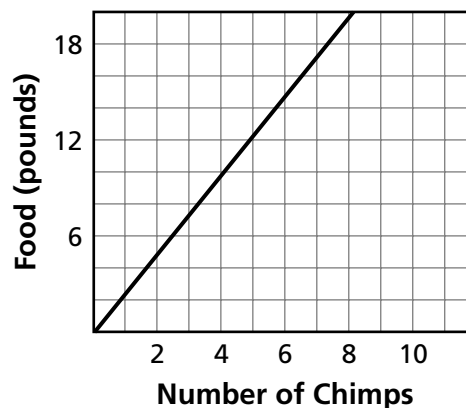
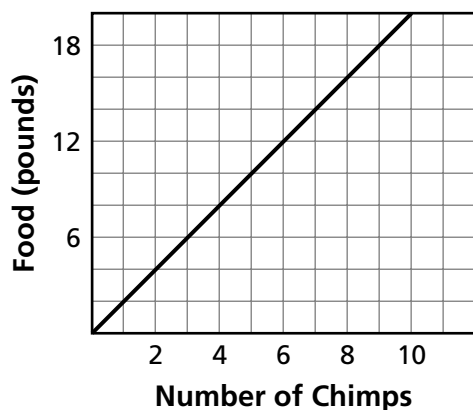
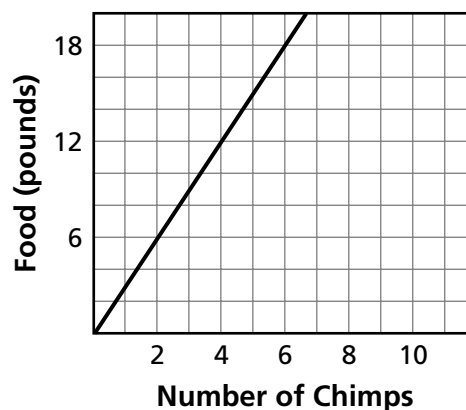


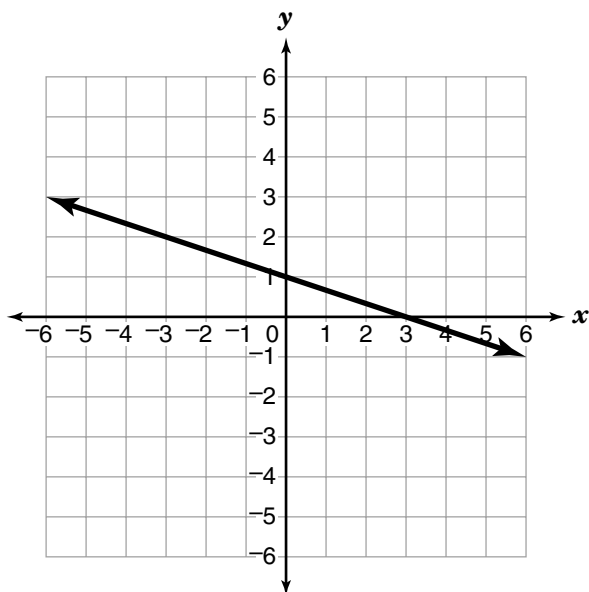
D

**58**

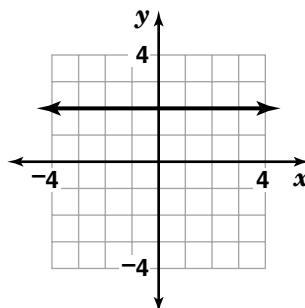
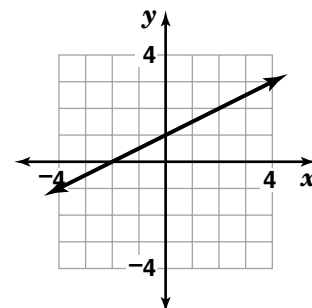
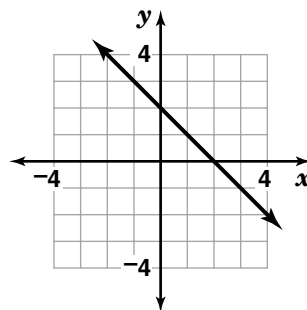
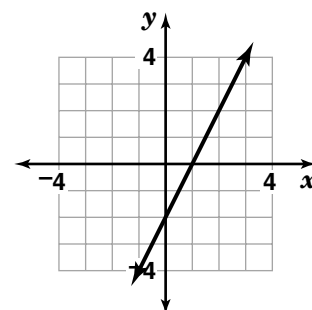
A zookeeper keeps the following table of the daily amount of food needed to feed the chimpanzees. Which of these graphs depicts the amount of food as a function of the number of chimpanzees?

Number of Chimpanzees	Amount of Food (in pounds)
2	6
4	12
5	15

**F****H****G****J**

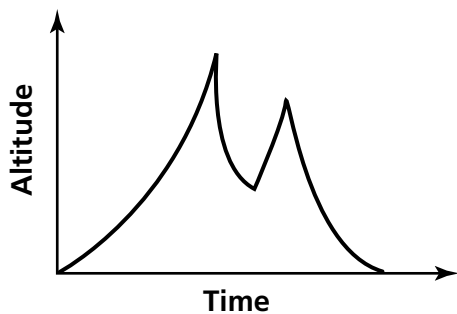
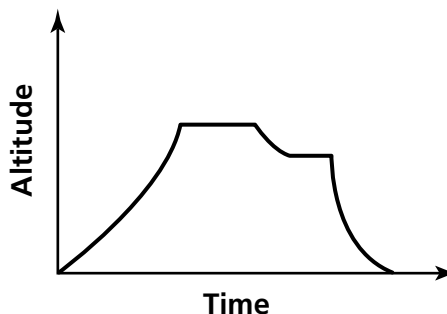
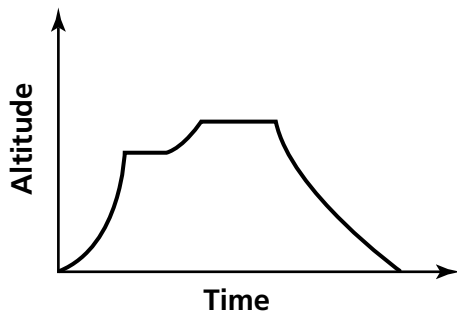
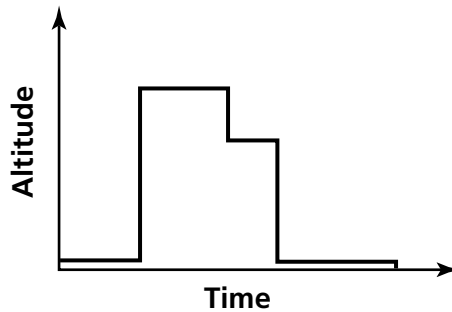
**Reporting Category:****5. Graphs and Graphing****Performance Indicator:****determine the slope from the graph of a linear equation  
(no labeled points)****Numbers 59 and 60****59** What is the slope of the line on the graph?

- A**  $-3$
- B**  $-\frac{1}{3}$
- C**  $\frac{1}{3}$
- D**  $3$

**60** Which graph shows a line with a slope of 2?**F****H****G****J**

**61**

A pilot takes off from an airport and climbs to an altitude at which she flies for 3 hours. She then descends to a lower altitude and cruises for 2 more hours before landing at the next airport. Which of the following graphs best models the flight?

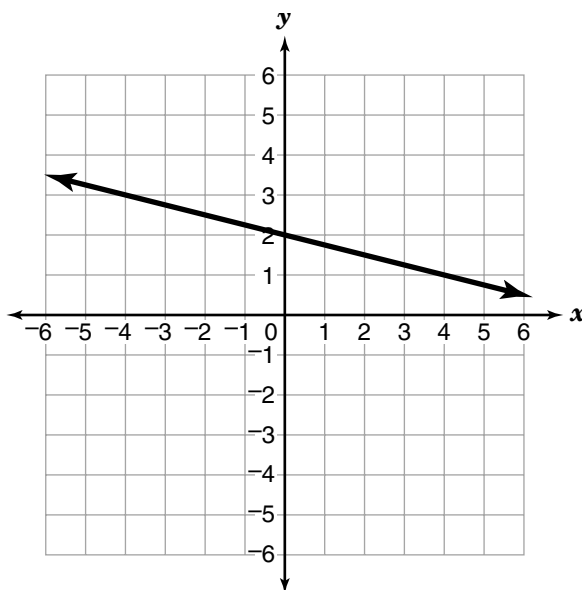
**A****C****B****D**

**Reporting Category:****5. Graphs and Graphing****Performance Indicator:**

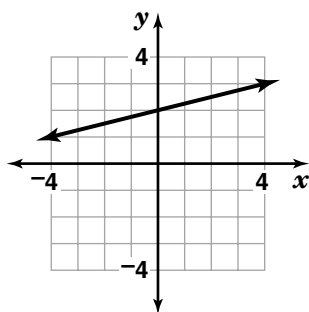
recognize the graphical transformation that occurs when coefficients and/or constants of the corresponding linear equations are changed

Numbers 62 through 64

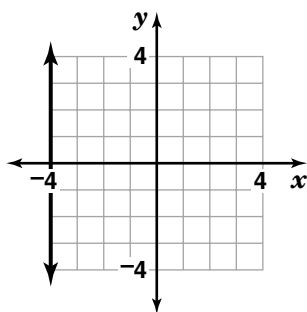
**62** The graph represents the equation  $y = -\frac{1}{4}x + 2$ .



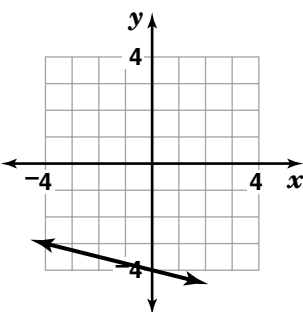
If the coefficient of  $x$  changes from  $-\frac{1}{4}$  to  $-4$ , what will the graph look like?



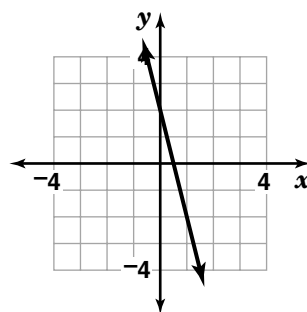
**F**



**G**



**H**



**J**

**63** What transformation of the graph occurs when  $y = x$  is changed to  $y = x + 2$ ?

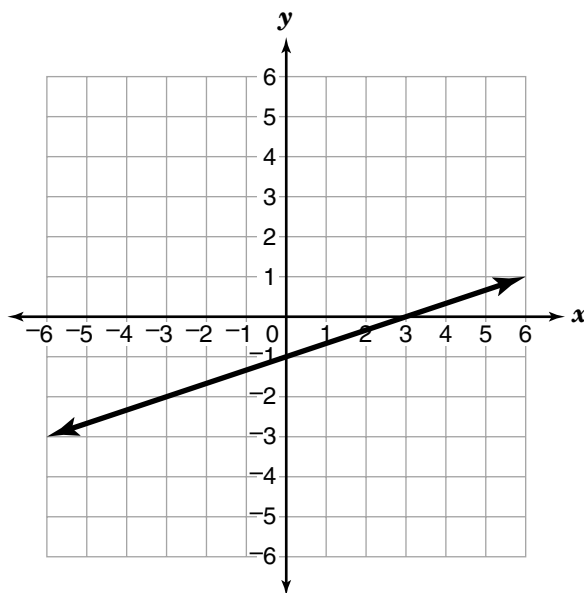
- A** The slope increases.
- B** The graph shifts up 2 units.
- C** The graph shifts down 2 units.
- D** The graph is reflected around the  $y$ -axis.

**Reporting Category:****5. Graphs and Graphing****Performance Indicator:**

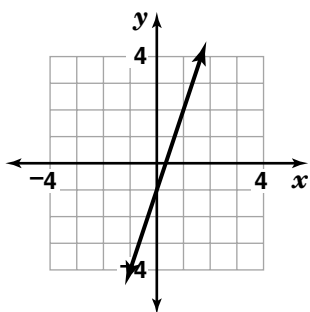
recognize the graphical transformation that occurs when coefficients and/or constants of the corresponding linear equations are changed

Numbers 62 through 64

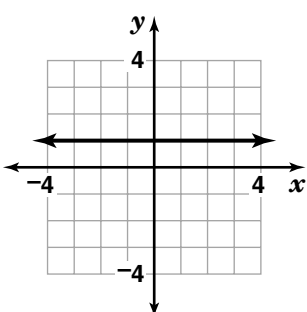
**64** The graph represents the equation  $3y = x - 3$ .



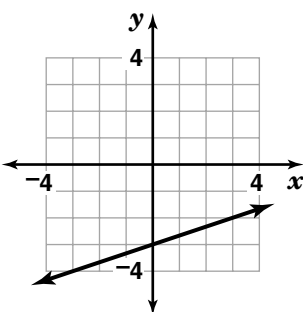
If the coefficient of  $y$  changes from 3 to 1, what will the new graph look like?



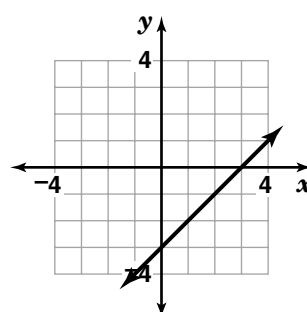
**F**



**G**

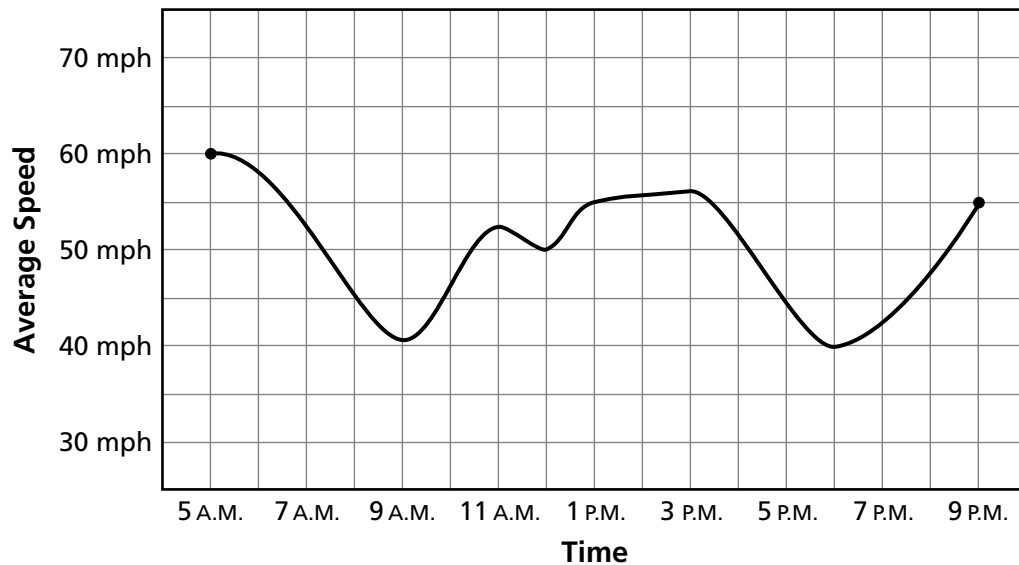


**H**



**J**

- 65** The following graph depicts the average speed of highway traffic as a function of time:



What is the domain (D) of this function?

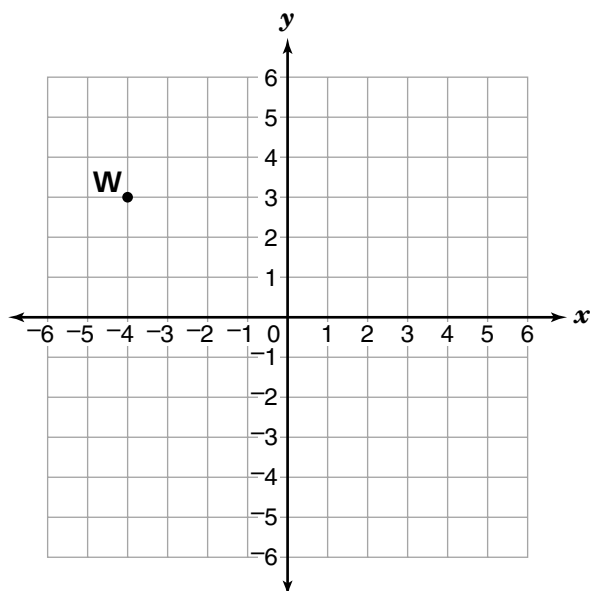
- A**  $5 \text{ A.M.} \leq D \leq 9 \text{ P.M.}$
- B**  $5 \text{ A.M.} \leq D \leq 60 \text{ mph}$
- C**  $12 \text{ A.M.} \leq D \leq 12 \text{ P.M.}$
- D**  $40 \text{ mph} \leq D \leq 60 \text{ mph}$

**Performance Indicator:**  
Numbers 66 and 67

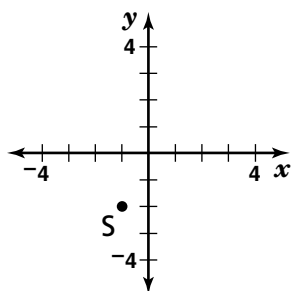
identify ordered pairs in the coordinate plane

- 66** Which ordered pair represents the coordinates of Point W shown on the graph?

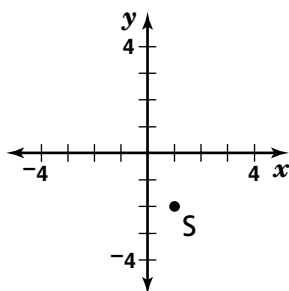
- F**  $(3, -4)$
- G**  $(-4, 3)$
- H**  $(-3, -4)$
- J**  $(-4, -3)$



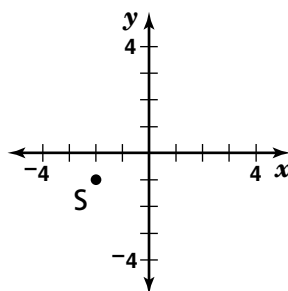
- 67** Which of these graphs shows Point S at  $(-1, -2)$ ?



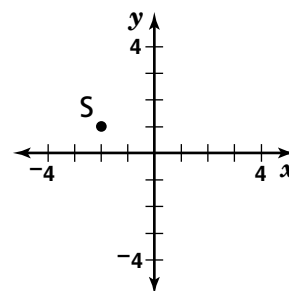
**A**



**B**



**C**

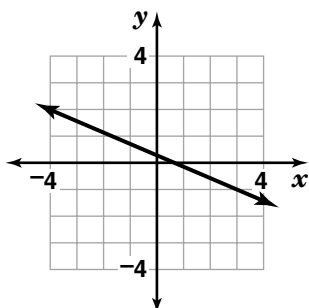
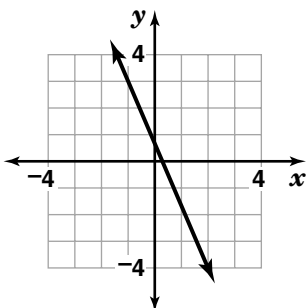
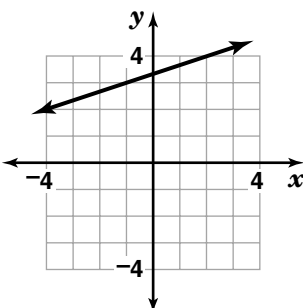
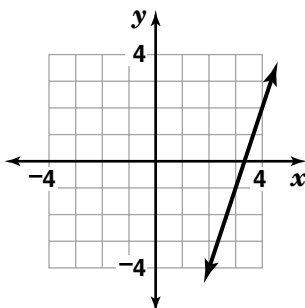


**D**

**Performance Indicator:**  
Numbers 68 through 70

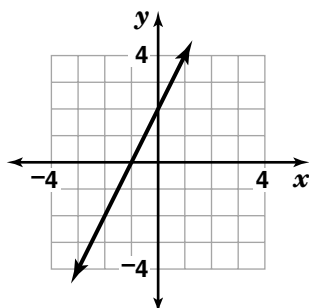
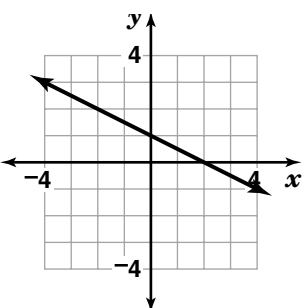
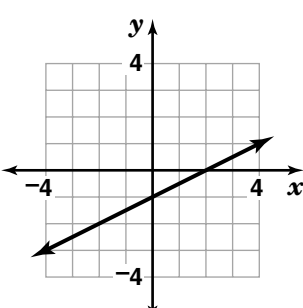
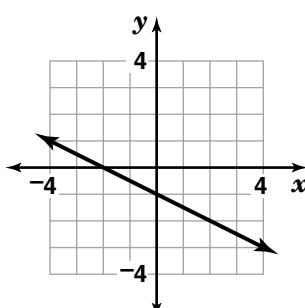
choose the matching linear graph given a set of ordered pairs

- 68** A line contains the points  $(-4, 2)$  and  $(3, -1)$ . Which graph illustrates the line?

**F****G****H****J**

- 69** Which linear graph is represented by this table of values?

$x$	$y$
0	-1
2	0
4	1

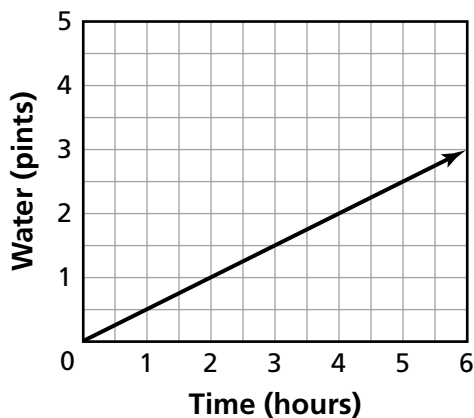
**A****B****C****D**

**Performance Indicator:**  
Numbers 68 through 70

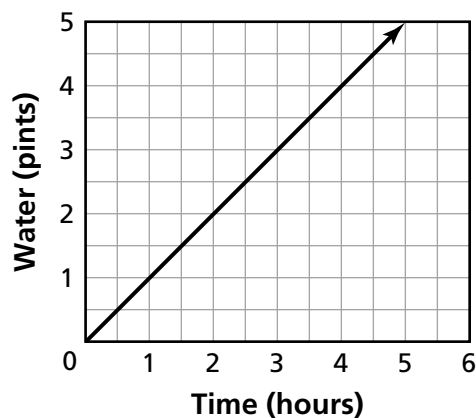
choose the matching linear graph given a set of ordered pairs

**70**

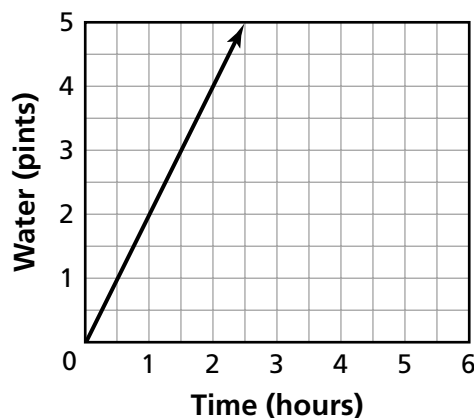
Jerry's sink was dripping. He put a bucket under the drip. After 2 hours, 1 pint of water had collected in the bucket. After 6 hours, 3 pints of water had collected. Assuming the sink dripped at a constant rate, which of these graphs shows the amount of water collecting in the bucket as a function of time?



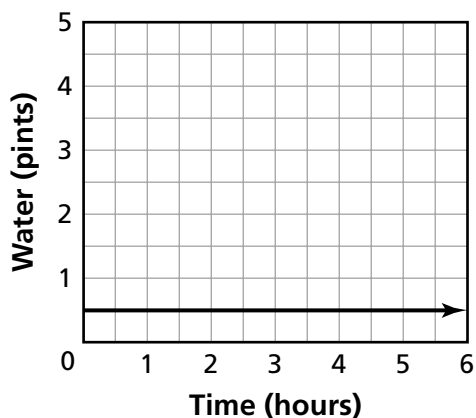
**F**



**H**



**G**



**J**

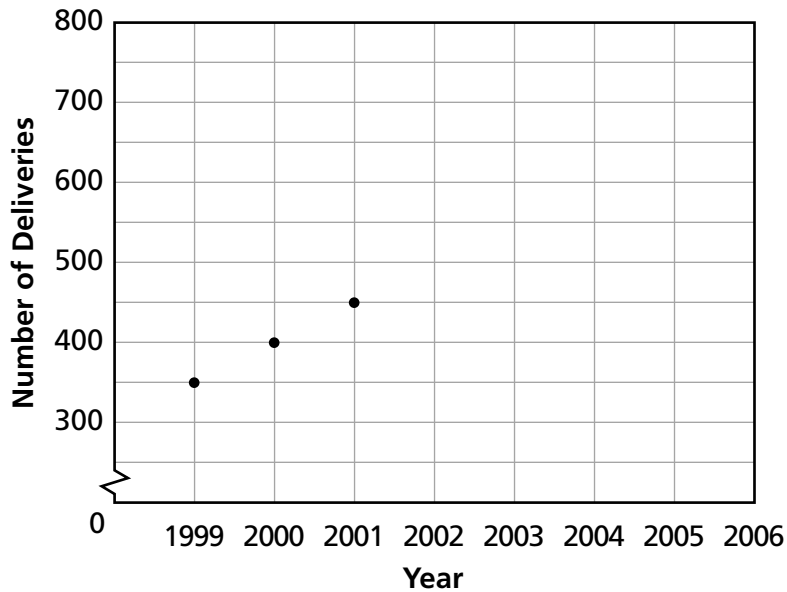
**Reporting Category:****5. Graphs and Graphing****Performance Indicator:**

make a prediction from the graph of a real-world linear data set

Numbers 71 and 72

**71**

The graph shows the number of babies delivered each year at Howard County General Hospital.



If the number of deliveries continues to increase at the same rate, in what year will the number of deliveries reach 650 ?

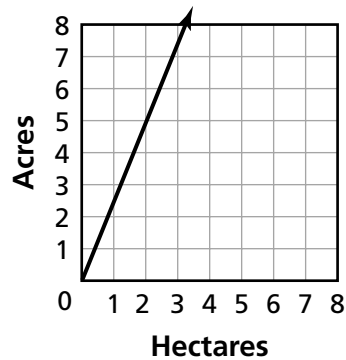
- A** 2003
- B** 2004
- C** 2005
- D** 2006

**Reporting Category:****5. Graphs and Graphing****Performance Indicator:**

make a prediction from the graph of a real-world linear data set

Numbers 71 and 72

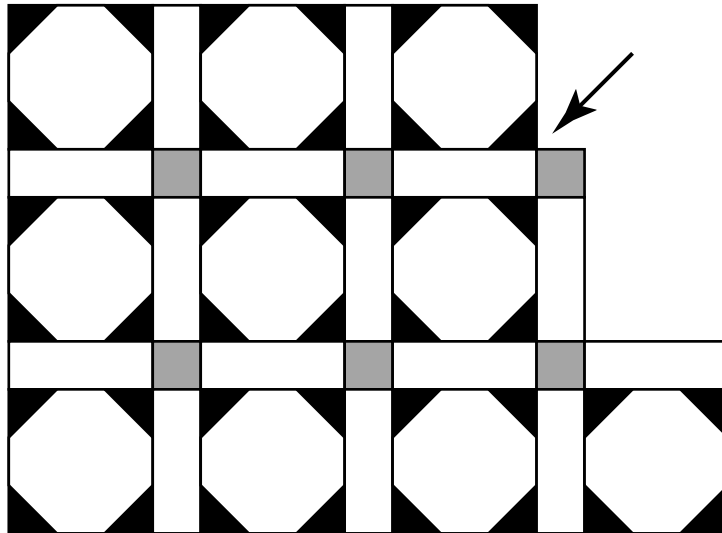
- 72** The linear relationship between acres and hectares is shown in the graph.



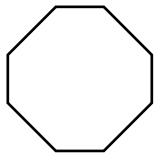
Mr. Codiga owns 5 hectares of land. About how many acres does he own?

- F** 2 acres
- G** 5 acres
- H** 10 acres
- J** 12 acres

**73** Shelby is making a quilt, as shown below.



What piece should she place at the arrow to extend the pattern?



**A**



**B**



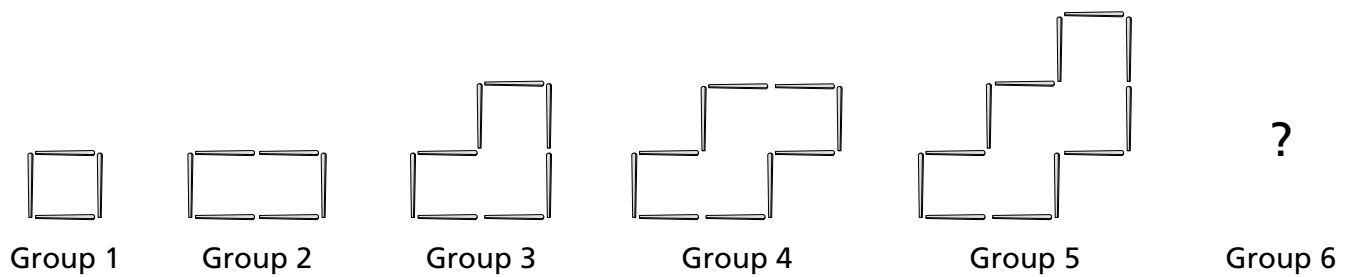
**C**



**D**

**74**

Carlos is grouping toothpicks in a pattern.



How many toothpicks will be in Group 6 ?

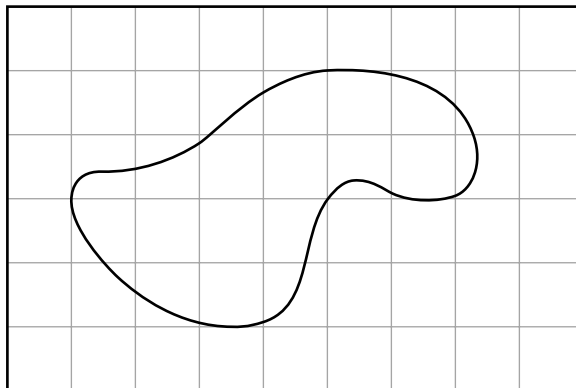
- F**    6  
**G**    10  
**H**    14  
**J**    16

**Reporting Category:****6. Spatial Sense and Geometric Concepts****Performance Indicator:**  
Number 75

estimate the area of irregular geometric figures on a grid

- 75** Estimate the area of the irregular figure shown on the grid.

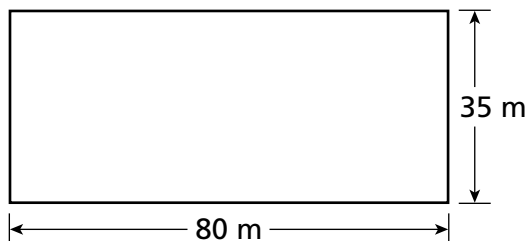
- A** 8
- B** 11
- C** 14
- D** 19

**Performance Indicator:**

apply the given formula to determine the area or perimeter of a rectangle

Numbers 76 and 77

- 76** Janessa ran once around a rectangular field. The field is 35 meters wide and 80 meters long.



How far did Janessa run?

- F** 115 meters
- G** 230 meters
- H** 835 meters
- J** 2,800 meters

- 77** How many square feet of carpet are needed to cover a 12-foot by 14-foot room?

- A** 38 square feet
- B** 52 square feet
- C** 168 square feet
- D** 336 square feet

**Reporting Category:****6. Spatial Sense and Geometric Concepts****Performance Indicator:**

apply the given formula to find the area of a circle, the circumference of a circle, or the volume of a rectangular solid

Numbers 78 through 80

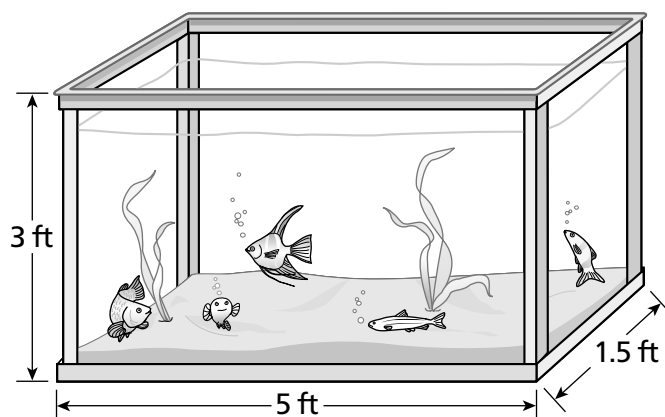
- 78** The radius of a bicycle wheel is 12 inches. What is its circumference?

**F**  $6\pi$  inches  
**G**  $12\pi$  inches  
**H**  $24\pi$  inches  
**J**  $144\pi$  inches

- 79** What is the area of a circle with a radius of 4 feet? (Round to the nearest whole number.)

**A** 16 square feet  
**B** 25 square feet  
**C** 50 square feet  
**D** 201 square feet

- 80** Javier bought the large fish tank shown.



What is the maximum number of cubic feet of water that the fish tank can hold?

**F** 9.5  
**G** 15.0  
**H** 16.5  
**J** 22.5

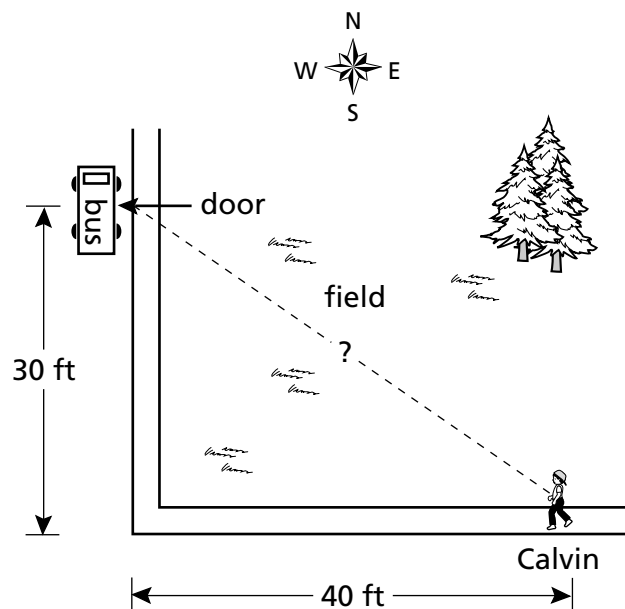
**Reporting Category:****6. Spatial Sense and Geometric Concepts****Performance Indicator:**

apply the given Pythagorean Theorem to a real life problem illustrated by a diagram (no radicals in answer)

Numbers 81 and 82

- 81** When his bus arrives, Calvin is 40 feet east of the corner. The door of the bus is 30 feet north of the corner. If Calvin runs directly across the field to the bus, how far will he run?

- A** 20 feet
- B** 40 feet
- C** 50 feet
- D** 70 feet

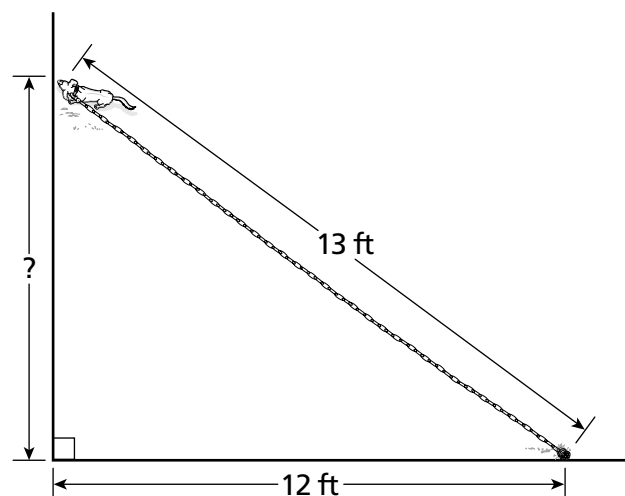


**Note:** Figure is not drawn to scale.

- 82** Rover is chained to the fence in his backyard. He is chained 12 feet from the corner of the fence, and the chain is 13 feet long.

How far along the side fence can Rover go?

- F** 1 foot
- G** 5 feet
- H** 14 feet
- J** 25 feet



**Note:** Figure is not drawn to scale.

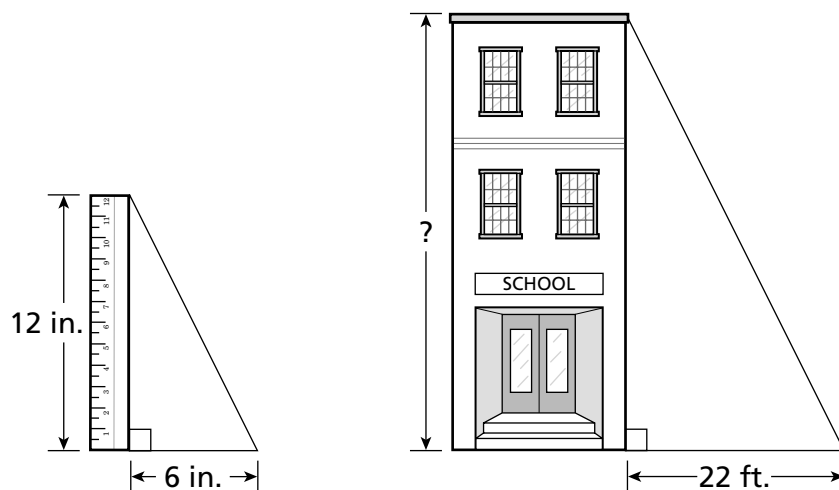
**Reporting Category:****6. Spatial Sense and Geometric Concepts****Performance Indicator:**

apply proportion and the concepts of similar triangles to find the length of a missing side of a triangle

Numbers 83 through 85

**83**

Shane wanted to find the height of his school building. He held a 12-inch ruler at right angles to the ground. The ruler cast a 6-inch shadow. At the same time, the school building cast a 22-foot shadow. What is the height of the building?



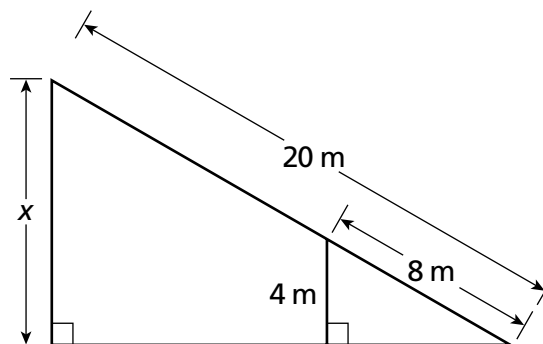
**Note:** Figures are not drawn to scale.

- A** 11 feet
- B** 28 feet
- C** 34 feet
- D** 44 feet

**84**

What is the value of  $x$  in the triangle shown?

- F** 8 meters
- G** 10 meters
- H** 12 meters
- J** 16 meters

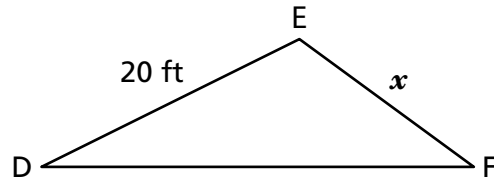
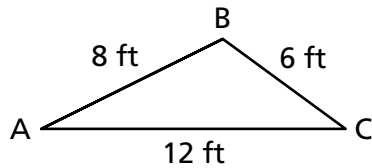


**Reporting Category:****6. Spatial Sense and Geometric Concepts****Performance Indicator:**

apply proportion and the concepts of similar triangles to find the length of a missing side of a triangle

Numbers 83 through 85

- 85**  $\triangle ABC$  is similar to  $\triangle DEF$ . What is the value of  $x$  ?



**Note:** Figures are not drawn to scale.

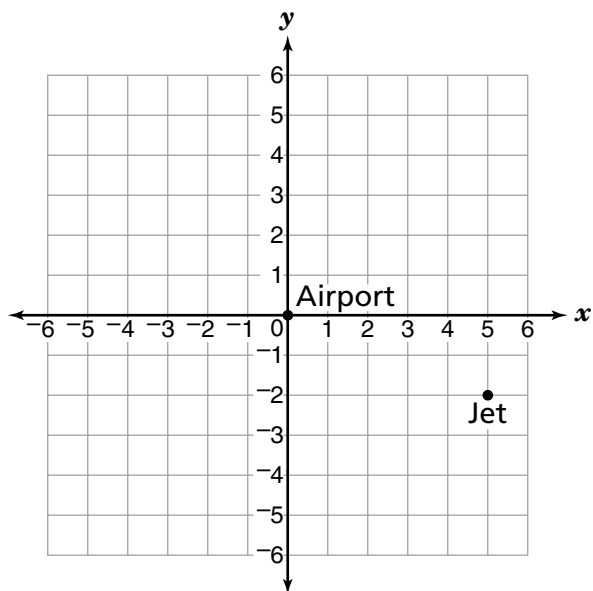
- A** 10 feet
- B** 15 feet
- C** 18 feet
- D** 24 feet

**Reporting Category:****6. Spatial Sense and Geometric Concepts****Performance Indicator:**

calculate the distance between two points given the Pythagorean Theorem and the distance formula

Numbers 86 through 88

- 86** An air traffic controller plotted the location of a jet on a grid as shown.

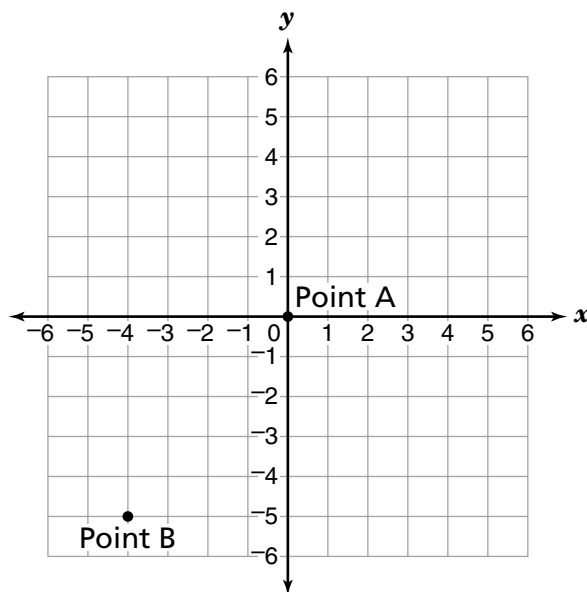


1 unit = 1 mile

How far is the jet from the airport?

- F** 6 miles  
**G** 7 miles  
**H**  $\sqrt{10}$  miles  
**J**  $\sqrt{29}$  miles

- 87** What is the distance from Point A to Point B on the graph?



- A**  $\sqrt{18}$   
**B**  $\sqrt{41}$   
**C** 7  
**D** 9

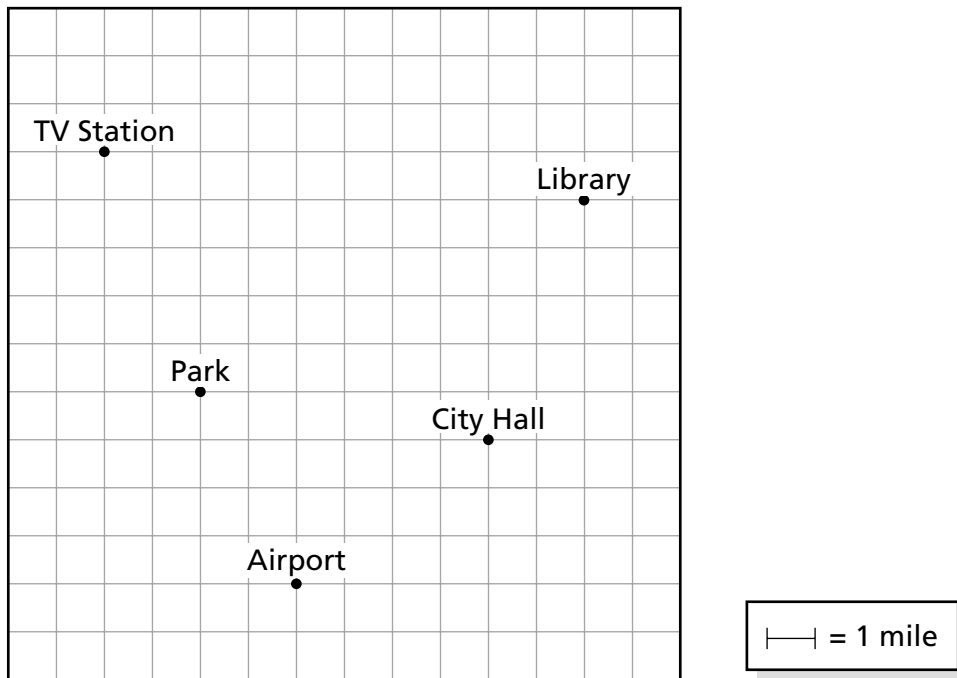
**Reporting Category:****6. Spatial Sense and Geometric Concepts****Performance Indicator:**

calculate the distance between two points given the Pythagorean Theorem and the distance formula

Numbers 86 through 88

**88**

Look at this map of a city.



A news helicopter flew from the TV station straight to City Hall to cover a parade. How far did it fly?

- F** 5 miles
- G** 8 miles
- H** 10 miles
- J** 14 miles

## Answer Key for the Gateway Mathematics Item Sampler

Item Number	Correct Answer
1	A
2	H
3	B
4	J
5	C
6	F
7	B
8	G
9	A
10	J
11	C
12	G
13	C
14	H
15	C
16	F
17	B
18	G
19	B
20	H
21	C
22	H

Item Number	Correct Answer
23	D
24	G
25	D
26	G
27	D
28	H
29	C
30	H
31	C
32	J
33	D
34	H
35	A
36	G
37	A
38	H
39	A
40	F
41	B
42	F
43	C
44	G

Item Number	Correct Answer
45	D
46	G
47	B
48	G
49	D
50	H
51	C
52	G
53	D
54	G
55	D
56	H
57	A
58	J
59	B
60	J
61	C
62	J
63	B
64	J
65	A
66	G

Item Number	Correct Answer
67	A
68	F
69	C
70	F
71	C
72	J
73	B
74	H
75	C
76	G
77	C
78	H
79	C
80	J
81	C
82	G
83	D
84	G
85	B
86	J
87	B
88	H